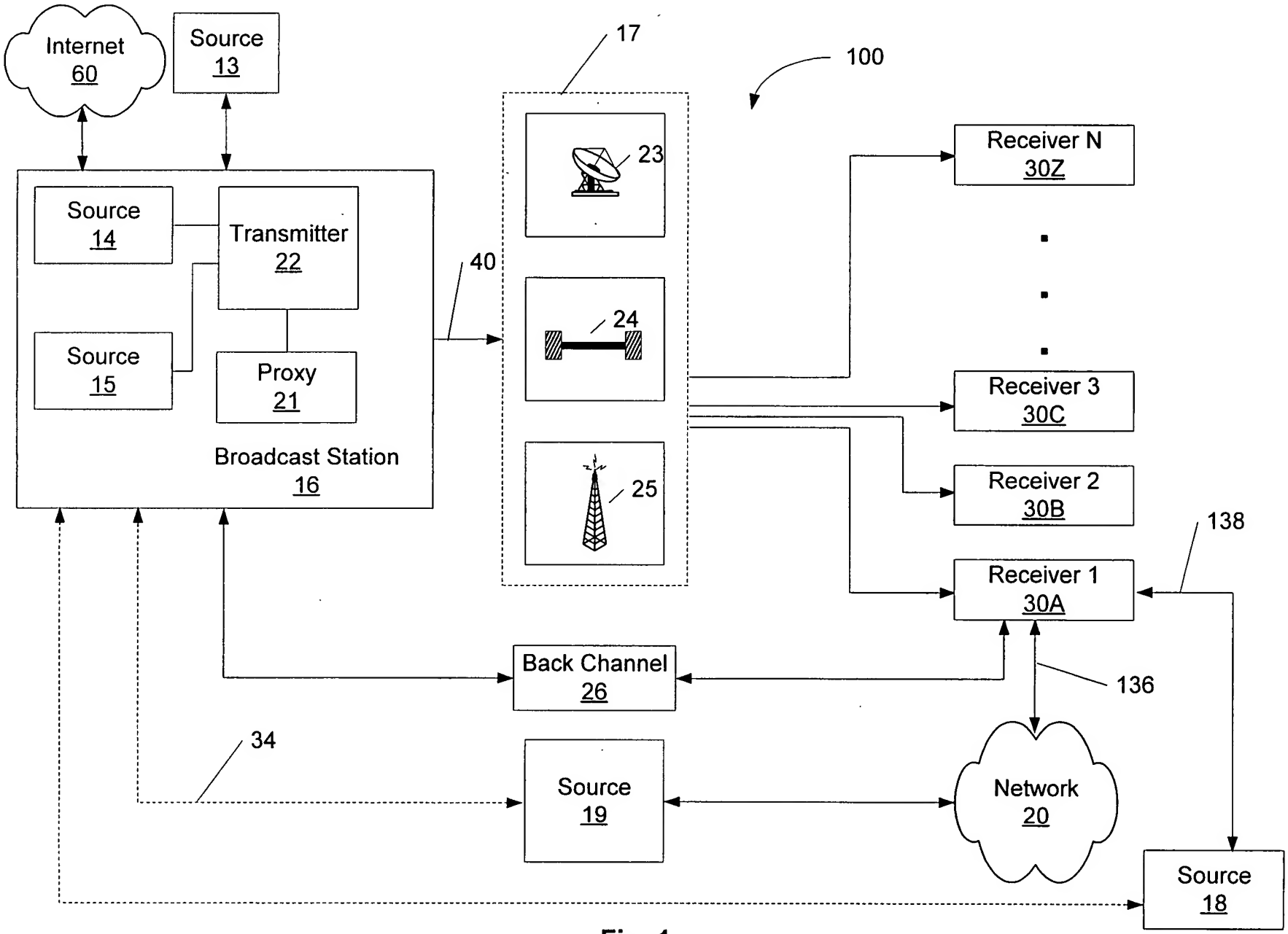
Internet
60
Source
13
17
100
23
Receiver N
30Z
Source
14
Transmitter
22
40
24
Source
15
Proxy
21
Receiver 3
30C
Broadcast Station
16
25
Receiver 2
30B
138
Receiver 1
30A
Back Channel
26
136
34
Source
19
Network
20
Source
18

Fig. 1

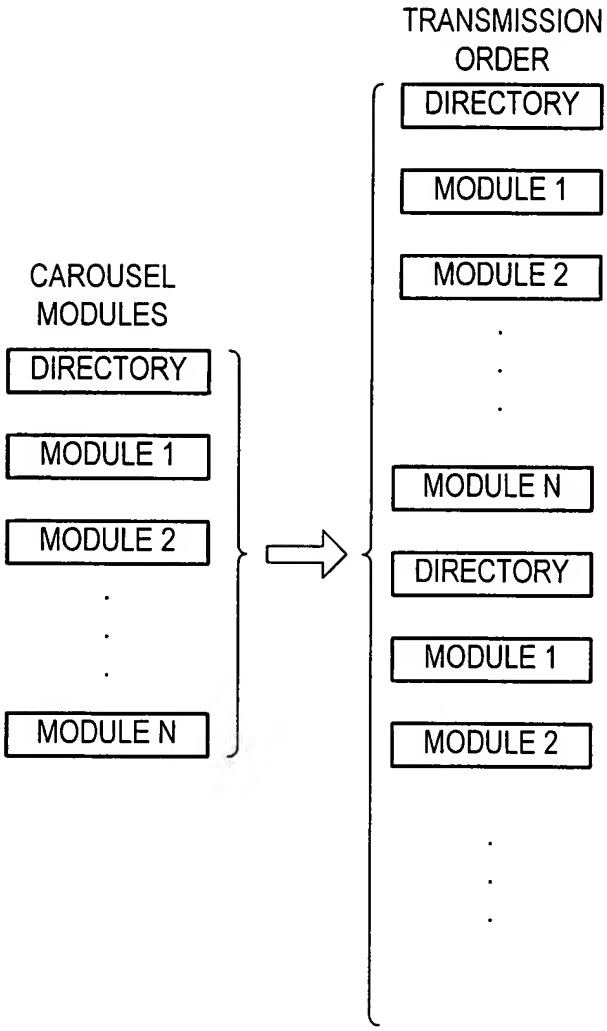
TRANSMISSION ORDER
DIRECTORY
MODULE 1
MODULE 2
MODULE N
DIRECTORY
MODULE 1
MODULE 2
CAROUSEL MODULES
DIRECTORY
MODULE 1
MODULE 2
MODULE N

Fig. 2

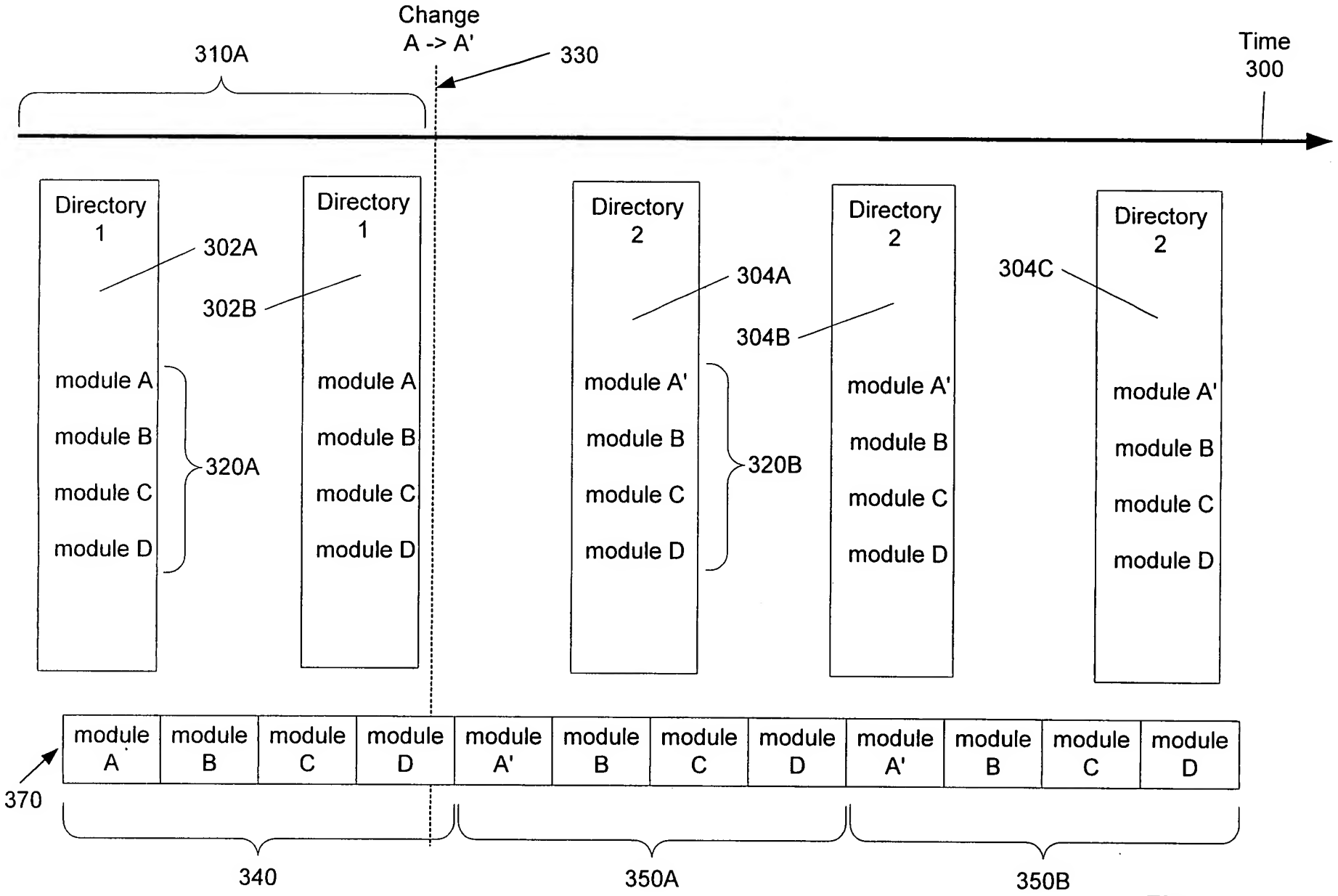
Change
A -> A'
310A
330
Time
300
Directory
1
302A
302B
module A
module B
module C
module D
320A
Directory
1
module A
module B
module C
module D
Directory
2
304A
module A'
module B
module C
module D
320B
Directory
2
304B
module A'
module B
module C
module D
Directory
2
304C
module A'
module B
module C
module D
module
A
module
B
module
C
module
D
module
A'
module
B
module
C
module
D
module
A'
module
B
module
C
module
D
370
340
350A
350B

Fig. 3

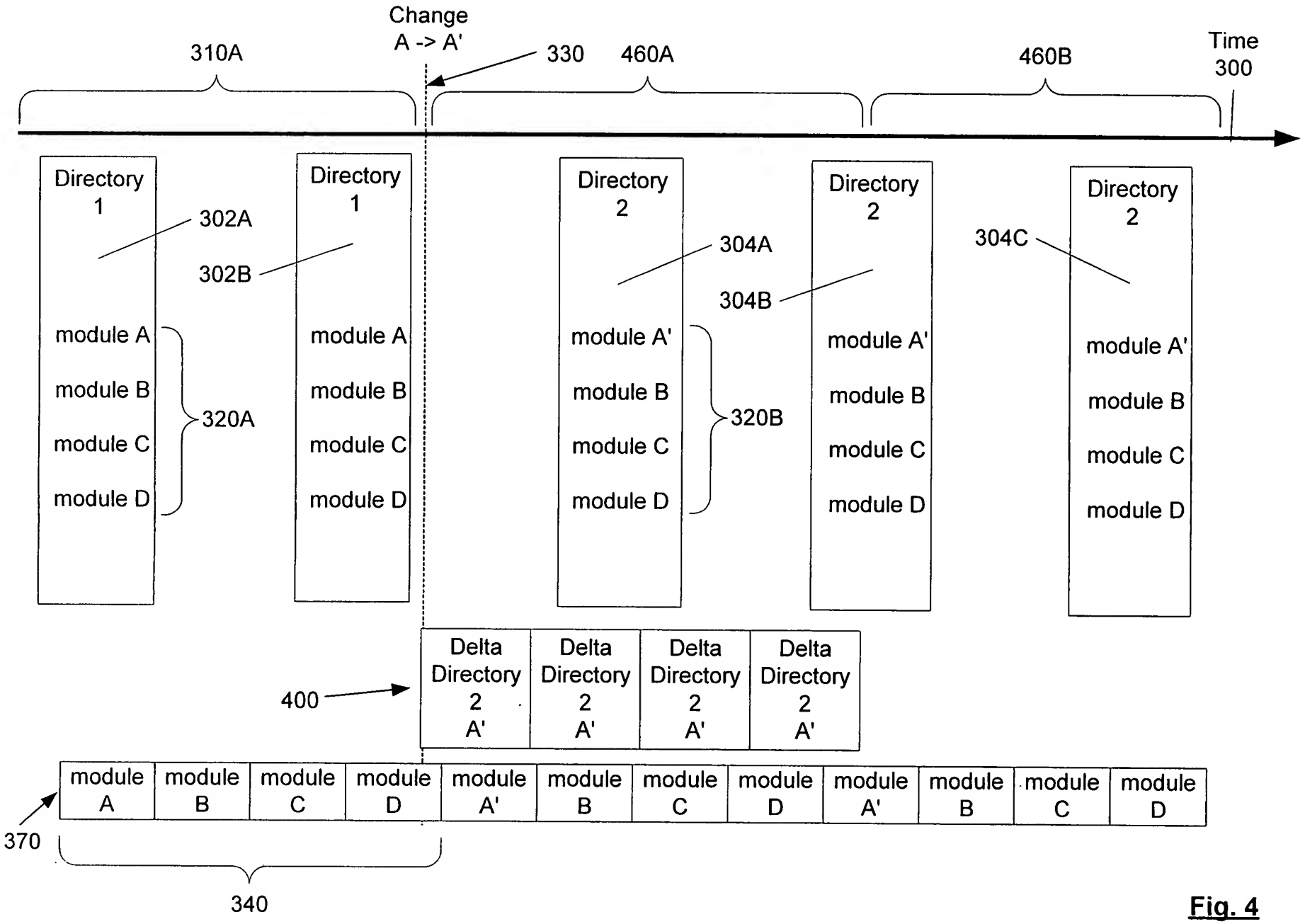
Change
A -> A'
310A
330
460A
460B
Time
300
Directory
1
302A
module A
module B
module C
module D
320A
Directory
1
302B
module A
module B
module C
module D
Directory
2
304A
module A'
module B
module C
module D
320B
Directory
2
304B
module A'
module B
module C
module D
Directory
2
304C
module A'
module B
module C
module D
400
Delta
Directory
2
A'
Delta
Directory
2
A'
Delta
Directory
2
A'
Delta
Directory
2
A'
module
A
module
B
module
C
module
D
module
A'
module
B
module
C
module
D
module
A'
module
B
module
C
module
D
370
340

Fig. 4

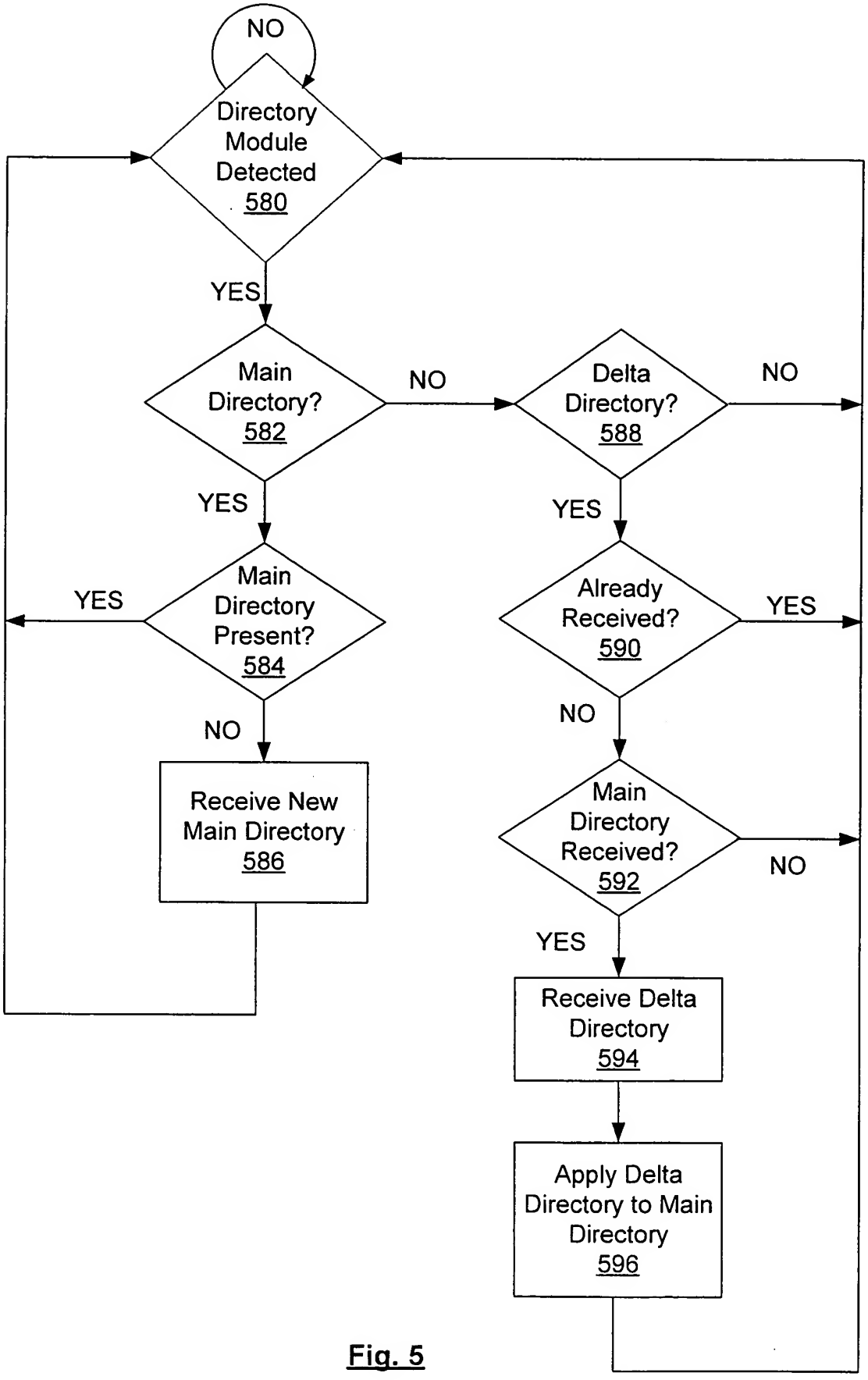
NO
Directory Module Detected 580
YES
Main Directory? 582
NO
Delta Directory? 588
NO
YES
YES
Main Directory Present? 584
YES
Already Received? 590
YES
NO
NO
Receive New Main Directory 586
Main Directory Received? 592
NO
YES
Receive Delta Directory 594
Apply Delta Directory to Main Directory 596

Fig. 5

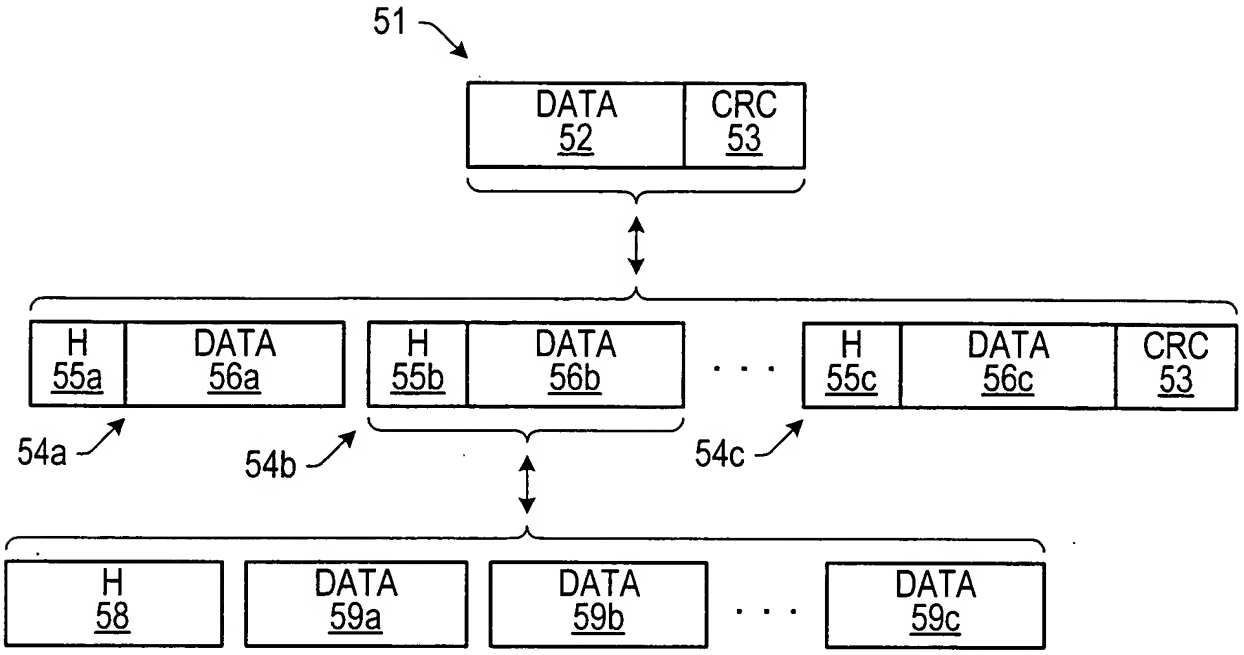
51
DATA
52
CRC
53
H
55a
DATA
56a
H
55b
DATA
56b
H
55c
DATA
56c
CRC
53
54a
54b
54c
H
58
DATA
59a
DATA
59b
DATA
59c

Fig. 6

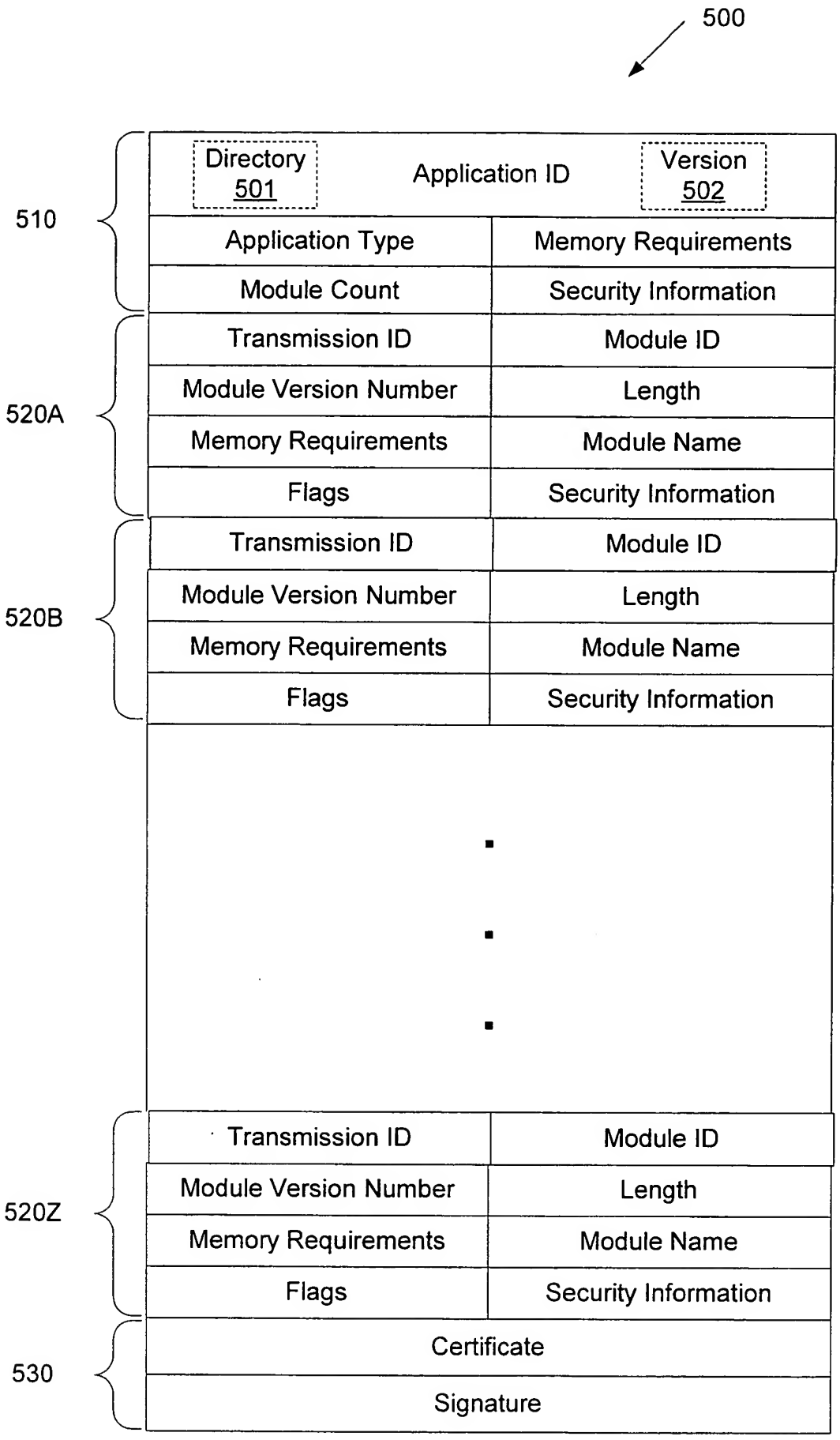
500
510
Directory 501
Application ID
Version 502
Application Type
Memory Requirements
Module Count
Security Information
520A
Transmission ID
Module ID
Module Version Number
Length
Memory Requirements
Module Name
Flags
Security Information
520B
Transmission ID
Module ID
Module Version Number
Length
Memory Requirements
Module Name
Flags
Security Information
520Z
Transmission ID
Module ID
Module Version Number
Length
Memory Requirements
Module Name
Flags
Security Information
530
Certificate
Signature

Fig. 7

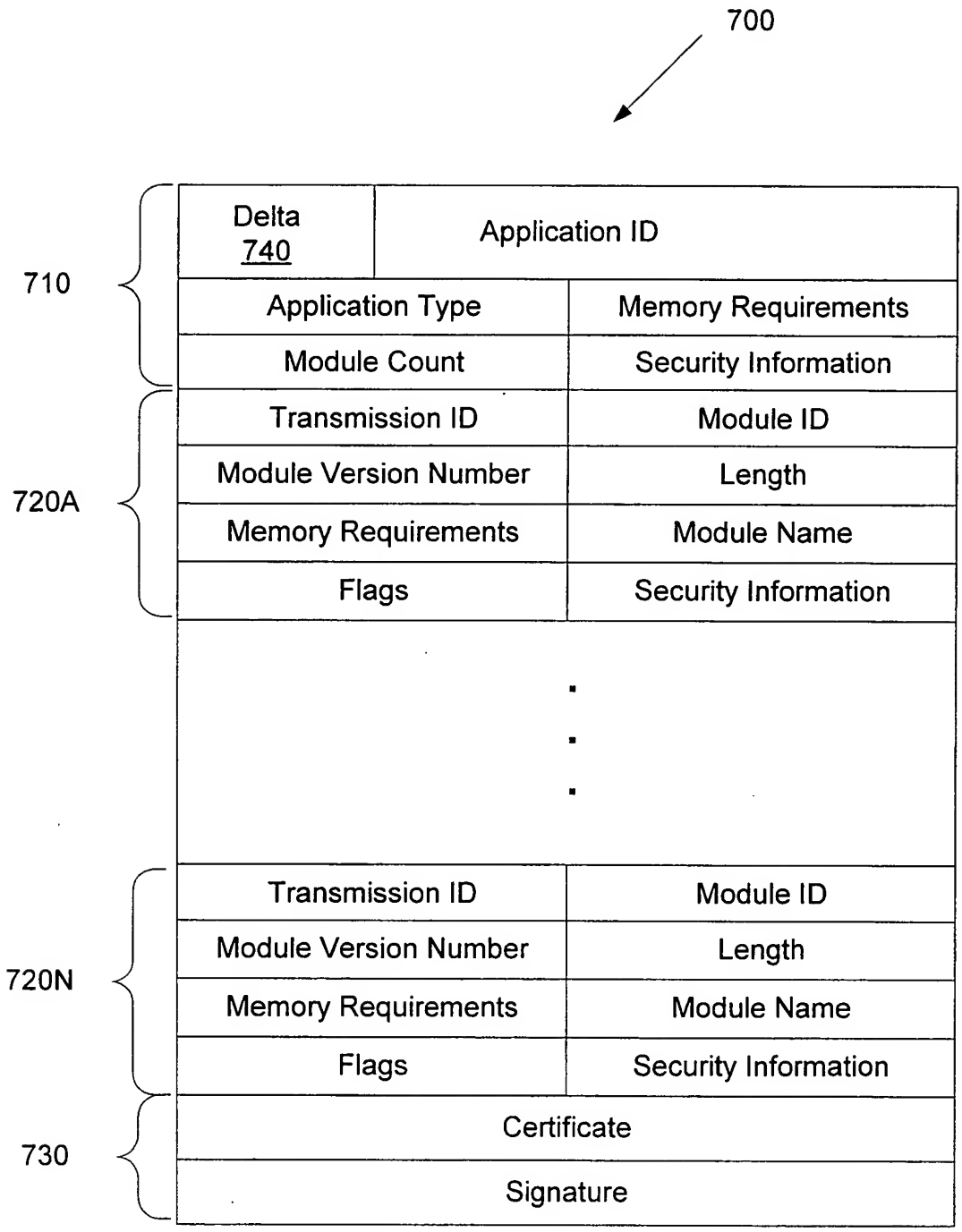
700
710
Delta
740
Application ID
Application Type
Memory Requirements
Module Count
Security Information
720A
Transmission ID
Module ID
Module Version Number
Length
Memory Requirements
Module Name
Flags
Security Information
720N
Transmission ID
Module ID
Module Version Number
Length
Memory Requirements
Module Name
Flags
Security Information
730
Certificate
Signature

Fig. 8

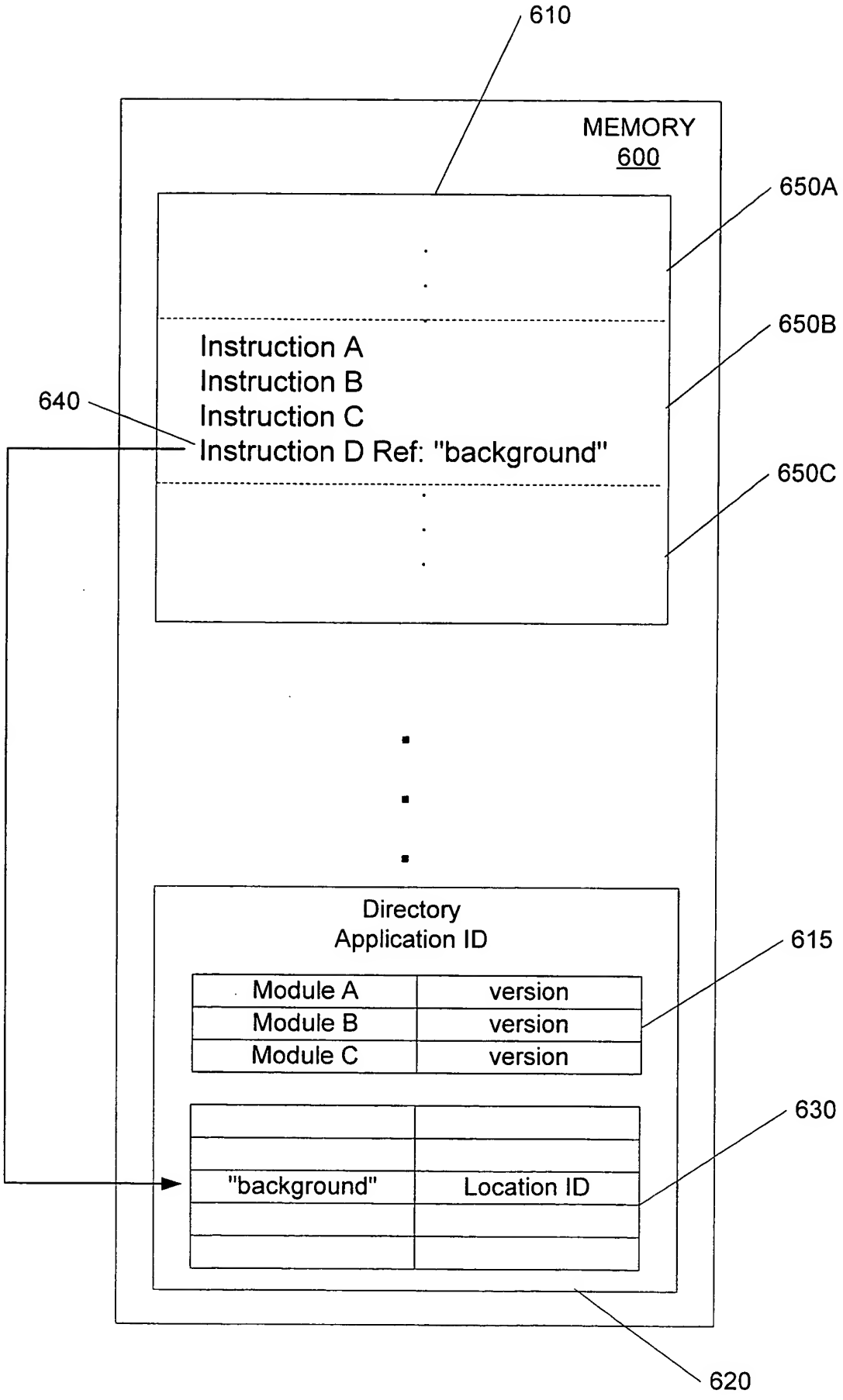
610
MEMORY
600
650A
650B
650C
640
Instruction A
Instruction B
Instruction C
Instruction D Ref: "background"
Directory
Application ID
615
Module A
version
Module B
version
Module C
version
630
"background"
Location ID
620

Fig. 9

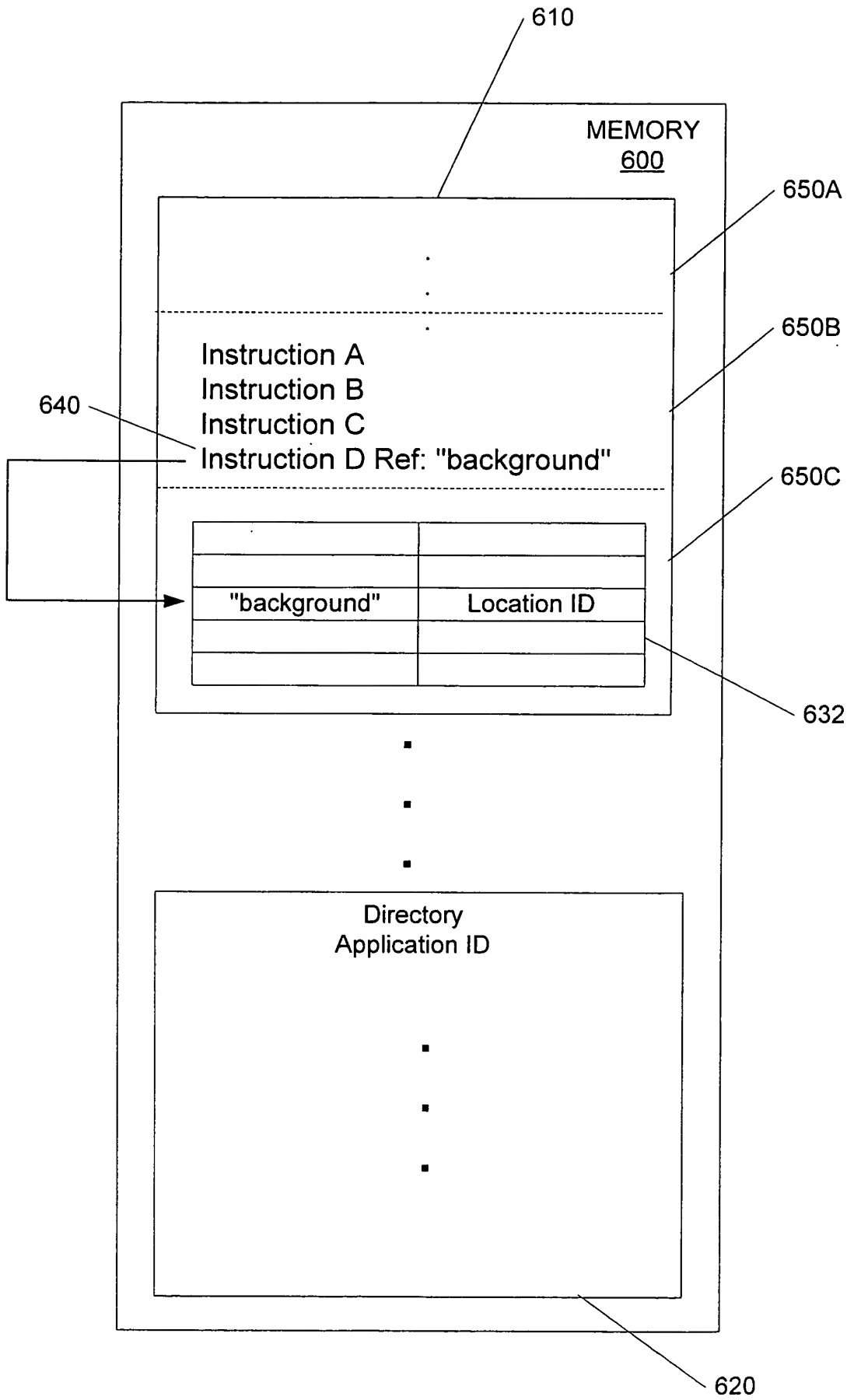
610
MEMORY
600
650A
650B
650C
640
Instruction A
Instruction B
Instruction C
Instruction D Ref: "background"
"background"
Location ID
632
Directory
Application ID
620

Fig. 10

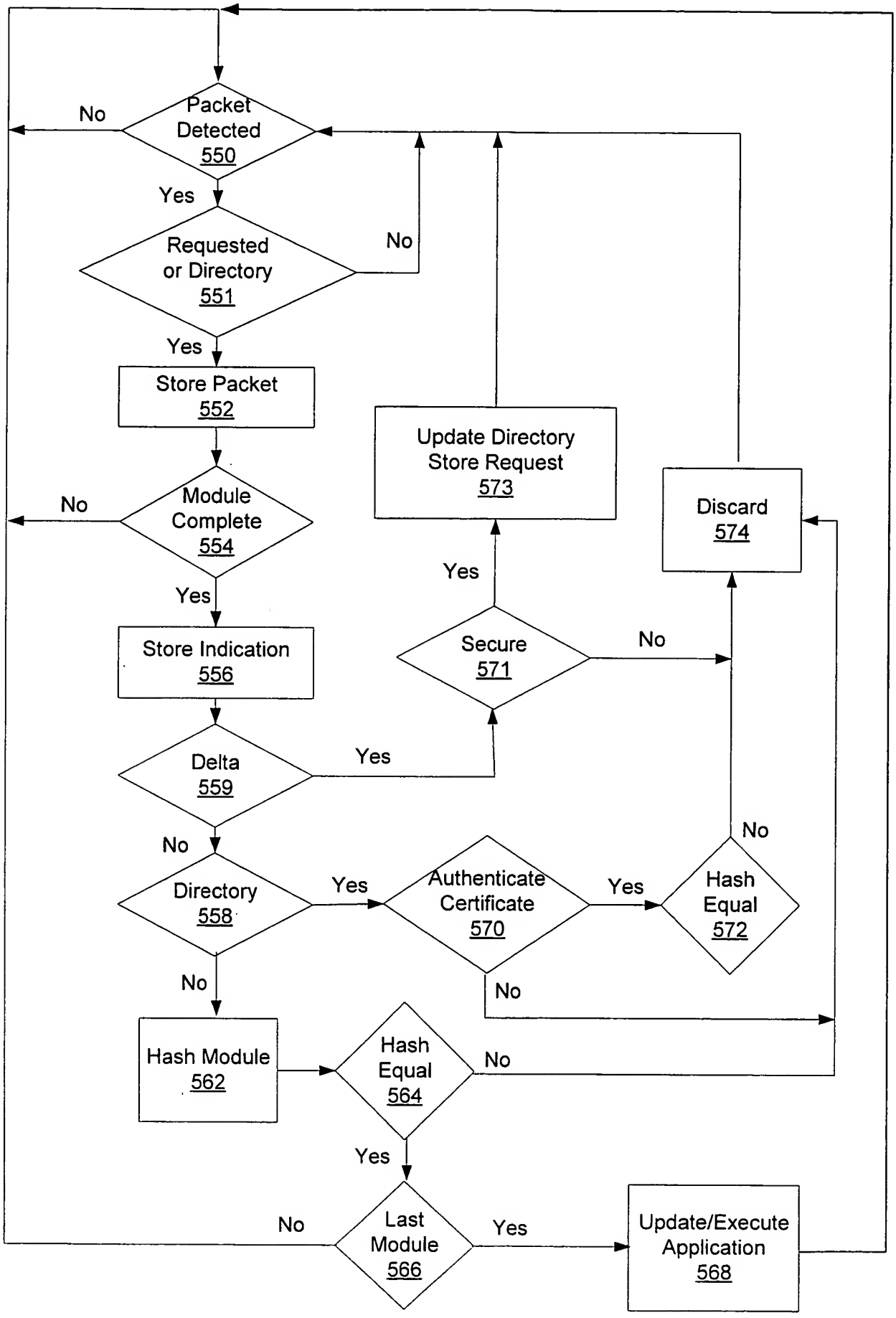
Packet Detected 550
No
Yes
Requested or Directory 551
No
Yes
Store Packet 552
Module Complete 554
No
Yes
Store Indication 556
Delta 559
Yes
No
Directory 558
Yes
No
Hash Module 562
Hash Equal 564
No
Yes
Last Module 566
No
Yes
Update/Execute Application 568
Authenticate Certificate 570
Yes
Hash Equal 572
No
No
Secure 571
Yes
No
Update Directory Store Request 573
Discard 574

Fig. 11

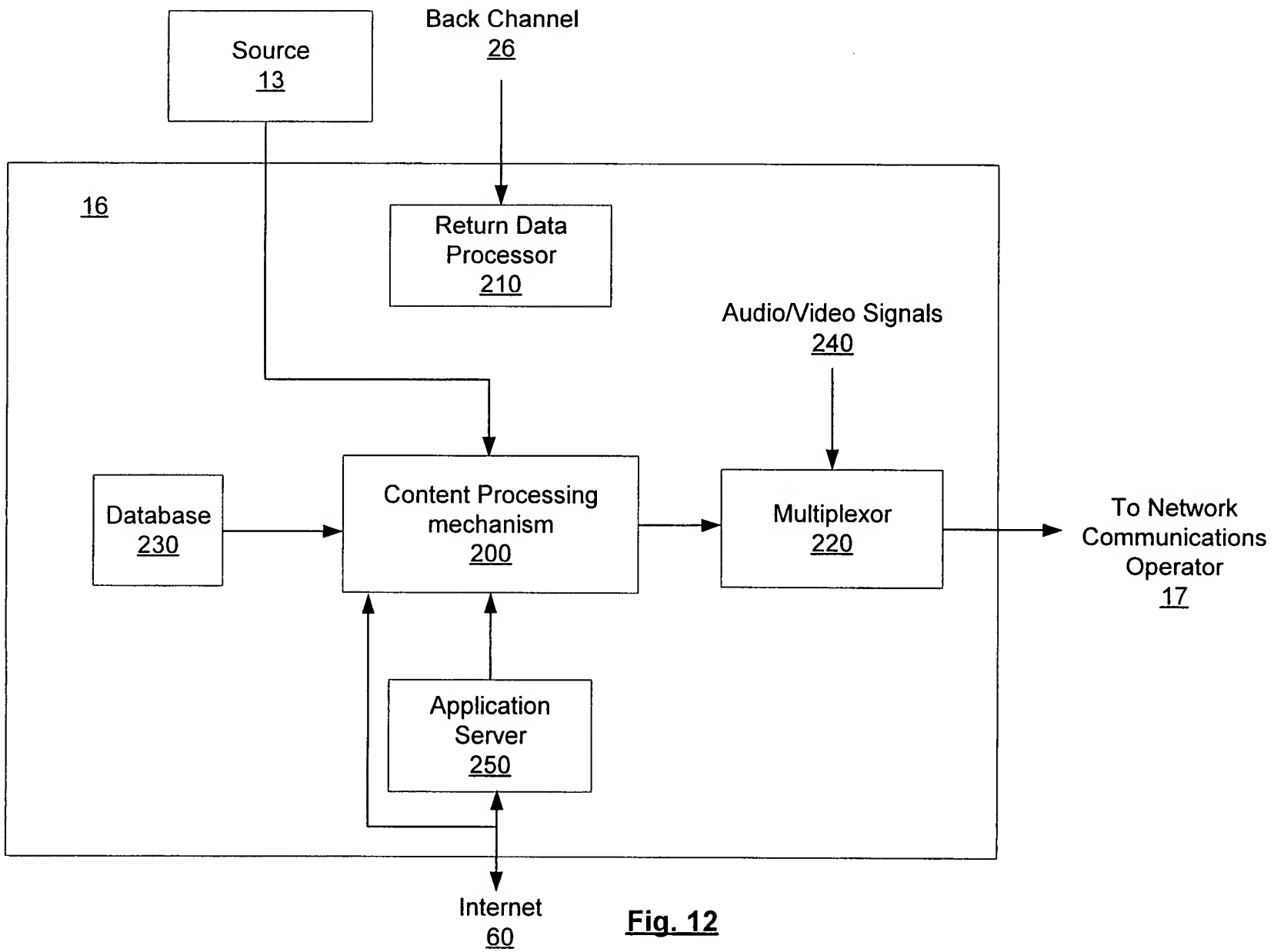
Source
13
Back Channel
26
16
Return Data
Processor
210
Audio/Video Signals
240
Database
230
Content Processing
mechanism
200
Multiplexor
220
To Network
Communications
Operator
17
Application
Server
250
Internet
60

Fig. 12

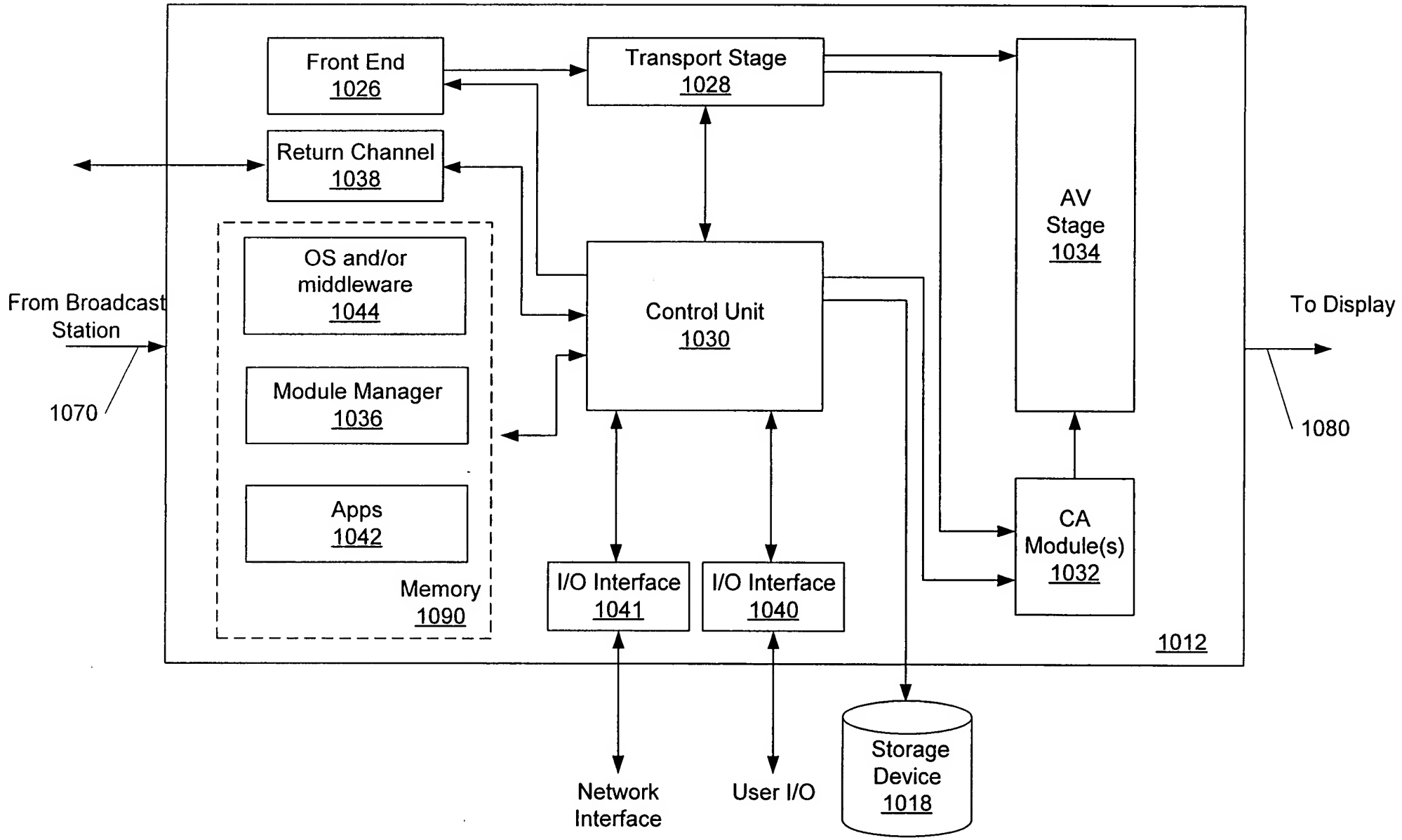
Front End
1026
Transport Stage
1028
Return Channel
1038
AV
Stage
1034
OS and/or
middleware
1044
From Broadcast
Station
Control Unit
1030
To Display
1070
Module Manager
1036
1080
Apps
1042
CA
Module(s)
1032
Memory
1090
I/O Interface
1041
I/O Interface
1040
1012
Storage
Device
1018
Network
Interface
User I/O

FIG. 13